VIII. *The Opisthomeres and the Gonapophyses in the* Dermaptera.

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The Opisthomeres.

If the forceps of an earwig be removed, it will be found that there is a strongly chitinised plate that extends from the posterior margin of the last tergite, bent downwards; this is the *pygidium*, the peculiar processes of which have long been familiar to Dermapterists as affording useful specific characters, especially in the Eudermaptera.

But if the pygidium be separated from the last tergite, it will be found that there is a second, and occasionally a third, smaller segment attached to it, which is tucked away above the penultimate sternite, and so only discernible upon dissection. This second plate in the metapygidium, and the third, when present, is the telson.

Verhoeff was the first systematist to realise the importance of these segments. He points out that Brunner refers to the telson under the name of sub-anal plate, but it was more probably the metapygidium that he saw, as the telson is but rarely developed. At the same time, Verhoeff called attention to these characters, which are better developed in the more primitive Protodermaptera, and gradually degenerate in the Eudermaptera.

The pygidium is the rudiment of the eleventh tergite, the metapygidium of the twelfth, and the telson of the thirteenth. These three segments are called by Verhoeff the opisthomeres. The first two are always present, but the telson is rarely chitinised : it is usually absent, or represented by a hyaline, delicate membrane.

The telson is an independent chitinised plate in the *Pygidicranidae* and *Pyragrinae*, and probably in the *Diplatyinae*. The figures of the Allostethine opisthomeres, and those of *Adiathetus tenebrator*, show an ill-defined membrane which I take to be the degenerate telson. But in the metapygidium and pygidium there are often visible transverse sutures, which seem to suggest a fusion of two plates.

Zacher maintains that the metapygidium fuses with the telson, and not with the pygidium, and that the line of demarcation is visible. I am not inclined to follow him. It is difficult to understand his description, as he gives no figures : he discusses the opisthomeres of *Allostethus* in some detail. As I read them (see fig. 5) the broad basal segment is the pygidium, the second, lobed segment metapygidium and the transparent membrane represents the telson. It is very noteworthy that the opisthomeres are of quite different forms in the two sexes. Fig. 5 represents the segments in the male, figs. 6 and 7 in the female and in the nymph.

In the *Psalidae* we can just detect the remains of the telson, but the pygidium seems, in its construction and pattern, to indicate a fusion of two segments : if that is so, the first segment is the pygidium and metapygidium united, the short transverse second plate the metapygidium, and Zacher is right : if this is so, the telson has no significance.

In Verhoeff's formula for the Forficuline abdomen, his eleventh tergite is the pygidium and metapygidium united, and so should read 11×12, while the telson is the thirteenth.

In *Kalocrania* sp. we find the pygidium very broad at the base, obtusely triangular, with a three-legged ridge

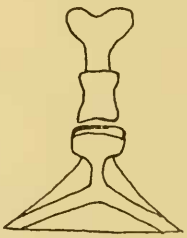

Fig. 1.—*Kalocrania*, sp. δ.

radiating from a central point, the apex of the posterior ridge terminating in a rectangular lobe : the metapygidium is quite separate, nearly rectangular, longer than broad, but decidedly shorter than the pygidium : the telson again is quite distinct, narrower than the metapygidium but dilated at the apex, forming two rounded lobes separated by a rounded emargination.

In *Pyragra fuscata* we have an analogous arrangement, the pygidium being transverse and in the form of an obtuse-angled triangle, with the apex truncate, at which point is the clear junction with the metapygidium, which narrows

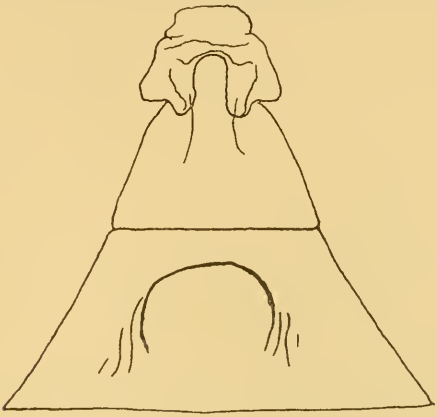

Fig. 2.—*Pyragra fuscata*, Serv.

towards the apex: the telson seems to be intimately connected to the metapygidium, and is of irregular shape, but smaller than the pygidium. The latter has a well-marked median depression.

In *Diplatys gladiator*, the pygidium is broad at the base,

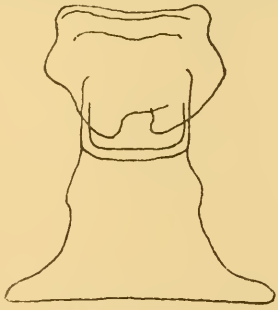

Fig. 3.—*Diplatys gladiator*, Burr, ♂.

but abruptly narrowed, the sides being nearly parallel: beyond this point, the detail is obscure in my specimen, but there seems to be a rectangular metapygidium clearly joined to the pygidium, and a broader, irregularly shaped telson.

In *Echinosoma afrum*, Beauv., I can see only two plates, which are strongly transverse: a faint suture perhaps indicates the fusion of the metapygidium with the

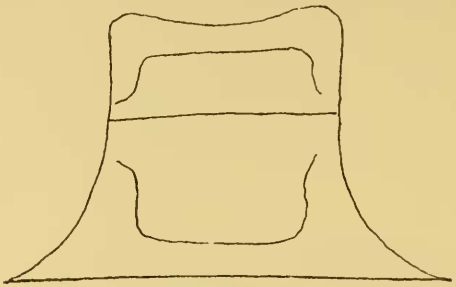

Fig. 4.—*Echinosoma afrum*, Beauv., ♂.

pygidium; the telson appears only represented by a faint membrane.

In the *Allostethinae*, Zacher says that all three plates are equally big, with which I cannot agree at all. In all my

Fig. 5.—*Allostethus indicum*, Hag., ♂.

specimens of this group, the pygidium is far bigger than the rest of the opisthomeres, being of the same shape as in *Pyragra*. In the female and nymph of *All. indicum*, the metapygidium is constricted about the middle, then strongly

dilated, with a semicircular convex margin : beyond this is quite discernible a broad, transverse, very feebly chitinised plate, with some bristles, which is the telson, already becoming weaker. In adult males the telson is even more

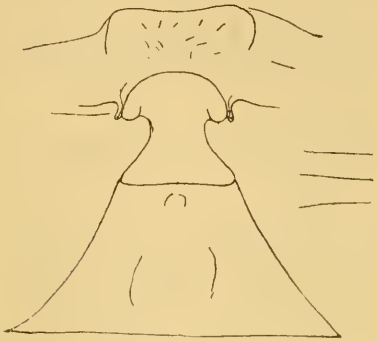

Fig. 6.—*Allostethus indicum*, Hag., ♀.

Fig. 7.—*Allostethus indicum*, Hag., ♂ *Nymph.*

membranous, with no defined edges, and the metapygidium nearly parallel-sided, with a pair of broad, pointed lobes at the angles, and a concave posterior margin. As Zacher points out, the female retains the more primitive form of opisthomeres, as she does of the forceps.

In the male of *Gonolabidura astruci* we find a very similar structure. The lobes on the metapygidium recall those

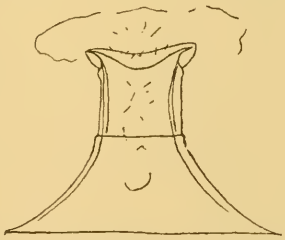

Fig. 8.—*Gonolabidura astruci*, Burr, ♂.

of the telson in *Pygidicrana*, which is perhaps Zacher's reason for identifying this plate as a fused telson and metapygidium.

In the *Psalidae* we find indications that the basal plate consists of the metapygidium fused with the pygidium : the following are my reasons :—

(i) The basal plate shows traces of a suture in *Euborellia moesta*.

(ii) The broad base and constricted waist suggest the similar form seen in the two distinct corresponding plates in *Allostethidae*.

(iii) The rounded lobes at the apex of the basal plates seem to correspond with the lobes at the outer corner of the metapygidium in the *Allostethidae*.

On the other hand, I admit that—

(i) The apical plates show transverse lines which may be the suture indicating fusion of metapygidium and telson.

(ii) In *Psalis pulchra* and *Euborellia moesta* the apical margin of the apical plate is membranous and seems in the former to have a distinct outline, so that this may be the degenerate membranous telson.

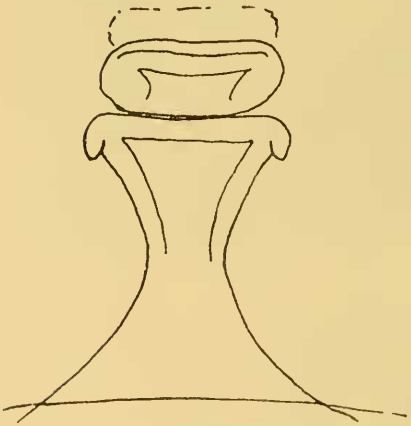

FIG. 9.—*Psalis pulchra*, Rehn, ♂.

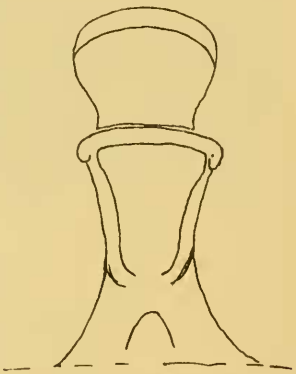

FIG. 10.—*Euborellia moesta*, Géné, ♀.

But on the whole I am inclined to regard the basal plate as the pygidium, the apical one as the metapygidium, and the faint apical membrane as the remains of the telson.

Zacher states that the suture between telson and metapygidium is sometimes visible, but refers to the apical plate as the supra-anal plate, which name he always uses for the telson.

In the *Brachylabinae*, I have examined the opisthomeres of *Nannisolabis formicoides*. Here we have only two plates : the basal one is about twice as long as broad, and gently constricted about the middle; this I take to be the pygidium; the apical plate is of the same breadth, but decidedly transverse, and this I take to be the metapygidium, the telson having gone.

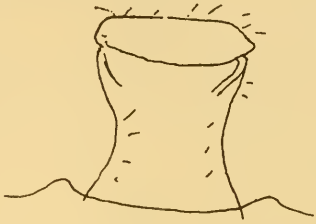

Fig. 11.—*Nannisolabis formicoides*, Burr, ♂.

On Zacher's interpretation, the large basal plate is the pygidium, the small apical one the metapygidium and telson fused.

At the external angles of the basal plate we see traces of the crests or keels, or strong chitinisation which is so well seen in the *Psalidae* figured, and in the metapygidium of the Allostethids.

In *Labidura riparia* we have an extreme form : there are only two plates; the pygidium shows no trace of suture

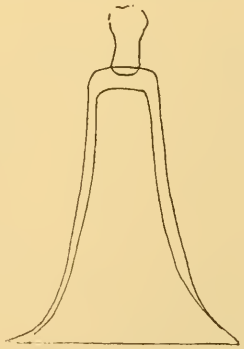

Fig. 12.—*Labidura riparia*, Pall., ♂.

or junction, is very large, and much longer than broad, with the sides reinforced; the apical plate or metapygidium is very small and narrow, longer than broad.

Verhoeff calls the big plate the pygidium, the small one the supra-anal plate, which is the same as the telson; Zacher also calls it the supra-anal plate, adding that no trace of the metapygidium remains, by which he implies, I suppose, that the latter has been entirely absorbed in the telson.

Perhaps we are both wrong, as the interpretation may be that the pygidium is very big, the metapygidium very small, and the telson disappeared; or that the metapygidium is fused into the pygidium.

I have unfortunately no Labiine opisthomere available at the moment, but those of the Chelisochid *Adiathetus tenebrator* are very remarkable. The basal plate is a little longer than broad and shows a reinforcement which may

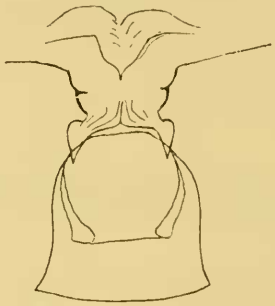

Fig. 13.—*Adiathetus tenebrator*, Kirby, ♂.

represent the absorbed metapygidium. The apical segment, which may be the metapygidium, or the telson, or both, is complex: there is an irregularly shaped, chitinous plate, with a deep incision in the posterior margin, which throws off laterally long acute lobes which are but feebly chitinised, apparently the homologues, the rounded or strengthened lobes of the Psalis or Allistethid opisthomeres: beyond this is a faint membrane, with a few bristles, which I read as the telson. If this is so, we have here a more generalised form of opisthomeres than in the *Brachylabidae* and in *Labidura*.

Of the *Anechurinae* I have examined two species, *Mesochelidura bolivari*, and *Anechura bipunctata*: in both, there is no trace of any third plate. The basal one is broad at the base, gradually narrowed towards the truncate apex. The apical plate is folded backwards at this

junction is a little longer, or shorter, respectively, than the basal plate, and as broad, the margin gently sinuate with rounded angles.

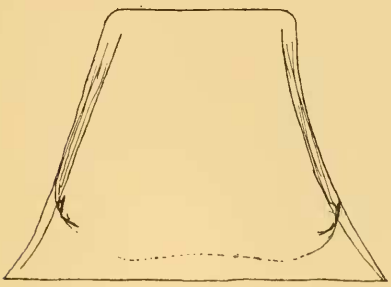

FIG. 14.—*Anechura bipunctata*, Fabr., ♂.

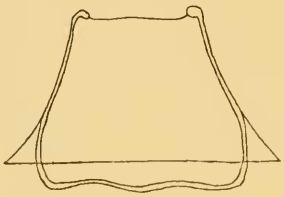

FIG. 15.—*Mesochelidura bolivari*, Borm., ♂.

In the former, there are chitinised knobs at the angles at the junction.

In *Forficula auricularia*, I have both sexes to offer. In both the basal plate is longer than broad, and slightly constricted, and the angles somewhat prominent: that of the male shows a different pattern from that of the female. The apical plate is more convex: in both the sides are irregular, and there are traces of a transverse suture,

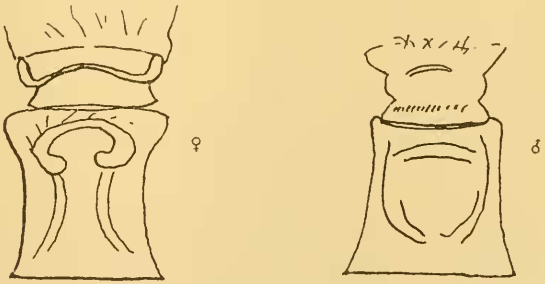

FIG. 16.—*Forficula auricularia*, L.

certainly suggestive of a fusion of two plates, more marked in the more primitive female than in the more specialised male: in both the posterior margin is weakly chitinised, with a few bristles.

I am bound to admit that it looks as though we have here a fusion of the metapygidium with the telson.

Apterygida albipennis shows a similar structure.

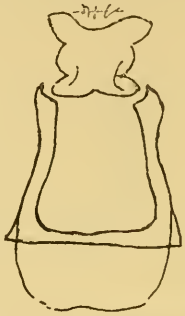

Fig. 17.—*Apterygida albipennis*, Meg., ♂.

In the primitive *Arixenia*, we should expect to find generalised opisthomeres; it is therefore surprising to find in the male of *A. jacobsoni* only two plates, the basal one nearly square, the apical one of the same breadth, but less than half as deep. Neither show any trace of suture or fusion, nor any specialisation.

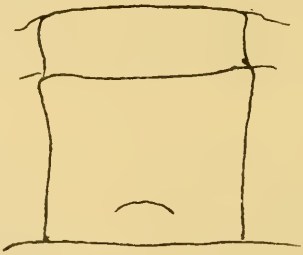

Fig. 18.—*Arixenia jacobsoni*, Burr, ♂.

The Gonapophyses.

If we lift the last sternites in the females of certain Protodermaptera, we find two sets of paired appendages termed the gonapophyses, supposed to be the homologues of the four valves of the ovipositor of the true Orthoptera.

Zacher was the first, as far as I am aware, to call attention to these structures in the Dermaptera, and he figures a few instances. We reproduce a copy of his figure showing the under surface of the extremity of the abdomen in the female of a species of *Kalocrania*, where BB

represent the gonapophyses of the ninth, and AA those of the eighth, segments. The thread-like appendages are

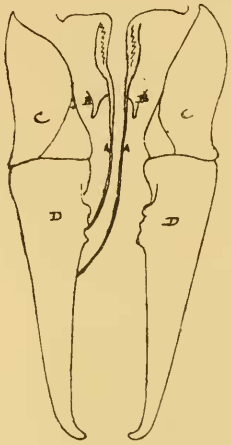

Fig. 19.—*Kalocrania*, sp. ♀. Apex of venter showing gonapophyses.

often to be seen protruding between the branches of the forceps; they are also thread-like in *Anataelia*, and in the *Diplatyinae*.

In the Echinosomatine the first pair is long and slender, though scarcely thread-like, while the second pair are

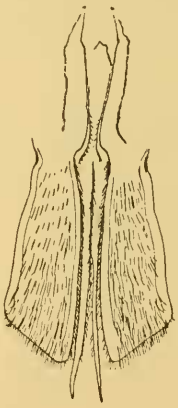

Fig. 20.—*Echinosoma afrum*, Beauv., gonapophyses.

developed into large, dilated, flat, pubescent lobes; the shape of these lobes may offer useful characters, and enable

us to define the species in this difficult group. Zacher figures the gonapophyses of several species; I add those of *Echinosoma afrum*.

The existence of gonapophyses in the *Allostethinae* has apparently been hitherto overlooked, even by such acute observers as Verhoeff and Zacher, so I was rather surprised to come across them; both pairs are in the form of short, rounded lobes, of about equal size; unfortunately, I had no fresh nor spirit-preserved material available for study in this case, but was obliged to dissect very old dried specimens, after treatment with potash; owing to the dirt accumulated from the decomposition and desiccation of the contents of the abdomen, all the specimens were obscured and discoloured, and I was not able to produce a satisfactory mount for illustration.

These curious organs have not yet been investigated with anything approaching thoroughness, and it remains to be ascertained whether they are of use to the possessor from a functional, or to the entomologist from a taxonomic, point of view. They certainly are a primitive feature; they have not yet been recorded in the Eudermaptera, nor in the *Labiduridae*, with the above-mentioned exception of the *Allostethinae*; till they were found here, they were considered to be characteristic of the *Pygidicranidae*, since they occur in the *Diplatyinae*, *Anataelinae*, *Pygidicraninae*, and the *Echinosomatinae*. Unfortunately for the sake of symmetry, they seem to be absent in the *Pyragrinae*, though they may yet be detected here when fresh specimens are available.

But the facts so far adduced place us at once in a dilemma; are we to place the *Allostethinae* in the *Pygidicranidae*, in spite of its undoubted Labidurine affinities? They seem really to represent an intermediate group, with highly characteristic features of their own, which they do not share either with the *Pygidicranidae*, or with the *Labiduridae*.